

**Florida  
Power**  
CORPORATION

# **CRYSTAL RIVER UNIT 3**

## **EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT**

*50-309/D*

**1-1-84**

**6-30-84**

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EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

1/1/84 - 6/30/84

FLORIDA POWER CORPORATION

CRYSTAL RIVER - UNIT 3

FACILITY OPERATING LICENSE NO. DPR-72

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## I. INTRODUCTION

This Effluent and Waste Disposal Report is submitted as required by Technical Specification 5.6.1.B of Appendix B to the Crystal River Unit 3 Facility Operating License No. DPR-72. The data in this report covers the period from January 1 to June 30, 1984.

There have been no changes to the Technical Specification Requirements for effluents and waste disposal in Appendix B, Section 2.0, of the Facility Operating License during the period of this report.

Crystal River Unit 3 has had no significant measurable radiological impact on the surrounding environment during the reporting period. This is based on the Radiological Environmental Monitoring Program data and the doses calculated for individuals and the population due to effluent releases being significantly below the levels required by 10 CFR 50, Appendix I.

The summations of gaseous and liquid effluents, solid waste shipments and meteorological data are in accordance with the tables in Regulatory Guide 1.21 (Rev. 1, 6/74) Appendix B.

The individual and population doses were calculated using GASPAR (for gaseous effluents) and LADTAP (for liquid effluents) computer codes obtained from the Nuclear Regulatory Commission and revised to include site specific data wherever possible. These doses are summarized in Tables I-1A and B.

The values reported for the activity of nuclides released are the actual measured activities. If no activity for a nuclide was detected for a quarter, the total of the lower limits of detection for all samples is reported as "<X.XXE-X". The totals of activity released is a total of only the nuclides that had measured activity.

TABLE I-1A  
SUMMATION OF DOSES TO INDIVIDUALS FROM  
GASEOUS AND LIQUID EFFLUENT RELEASES

Beta Air Dose =  $2.81\text{E-}03$   
Gamma Air Dose =  $1.17\text{E-}03$

First Quarter  
(Design Objective =  $2.00\text{E+}01$  mrad/yr)  
(Design Objective =  $1.00\text{E+}01$  mrad/yr)

Effluent Release	Distance (Mi.) and Direction	<u>Whole Body Dose</u>		Dose (mrem/yr)	Design Objectives (mrem/yr)
		Age Group	Organ		
Continuous Gaseous	4.00 East	Child	-	$5.24\text{E-}04$	$5.00\text{E+}00$
Batch Gaseous	4.00 East	Adult	-	$2.07\text{E-}04$	
Continuous Liquid	-	Teen	-	$1.15\text{E-}05$	$5.00\text{E+}00$
Batch Liquid	-	Teen	-	$2.72\text{E-}03$	
<u>Organ Dose</u>					
Continuous Gaseous	4.00 East	Infant	Skin	$1.31\text{E-}03$	$1.50\text{E+}01$
Batch Gaseous	4.00 East	Each	Skin	$5.87\text{E-}04$	
Continuous Liquid	-	Adult	GI-LLI	$2.61\text{E-}05$	$5.00\text{E+}00$
Batch Liquid	-	Adult	GI-LLI	$8.24\text{E-}03$	

Beta Air Dose =  $4.13\text{E-}04$   
Gamma Air Dose =  $1.17\text{E-}04$

Second Quarter  
(Design Objective =  $2.00\text{E+}0$  mrad/yr)  
(Design Objective =  $1.00\text{E+}01$  mrad/yr)

<u>Whole Body Dose</u>					
Continuous Gaseous	4.00 East	Child	-	$2.94\text{E-}04$	$5.00\text{E+}00$
Batch Gaseous	4.00 East	Adult	-	$6.74\text{E-}05$	
Continuous Liquid	-	Adult	-	$1.16\text{E-}06$	$5.00\text{E+}00$
Batch Liquid	-	Teen	-	$2.97\text{E-}03$	
<u>Organ Dose</u>					
Continuous Gaseous	4.00 East	Infant	Thyroid	$1.72\text{E-}03$	$1.50\text{E+}01$
Batch Gaseous	4.00 East	Each	Skin	$1.72\text{E-}04$	
Continuous Liquid	-	Adult	GI-LLI	$5.52\text{E-}05$	$5.00\text{E+}00$
Batch Liquid	-	Adult	GI-LLI	$2.68\text{E-}01$	

TABLE I-1B

SUMMATION OF DOSES TO THE POPULATION  
FROM GASEOUS AND LIQUID EFFLUENT RELEASES

First Quarter

<u>Effluent Release</u>	<u>Whole Body Dose</u>		<u>Organ</u>	<u>Organ Dose</u>	
	<u>Dose</u> (MAN-REM/YR)	<u>Design Objectives</u> (MAN-REM/YR)		<u>Dose</u> (MAN-REM/YR)	<u>Design Objectives</u> (MAN-REM/YR)
Continuous Gases	6.65E-03	5.00E+02	Skin	2.18E-02	5.00E+02
Batch Gaseous	1.71E-03		Skin	6.04E-03	
Continuous Liquid	4.33E-04	-	GI-LLI	1.81E-03	-
Batch Liquid	3.12E-01	-	GI-LLI	9.00E-01	-

Second Quarter

Continuous Gaseous	3.54E-03	5.00E+02	Skin	1.01E-02	5.00E+02
Batch Gaseous	1.01E-03		Skin	3.40E-03	
Continuous Liquid	1.46E-04	-	GI-LLI	7.03E-03	-
Batch Liquid	1.93E-01	-	GI-LLI	3.42E+01	-

## II. RELEASES OF AND DOSES FROM GASEOUS EFFLUENTS

There are three normal methods of releasing gaseous effluents to the atmosphere: 1) continuous release via the Auxiliary Building Exhaust; 2) batch release from the Waste Gas Decay Tanks; and 3) batch and continuous releases from the Reactor Building purge. All three methods release to the atmosphere from one point, the Plant Vent.

### 1. Regulatory Limits

The Technical Specification limits for gaseous effluent releases are as follows:

#### Specification 2.4.2

The terms used in these Specifications are as follows:

subscripts v, refers to vent releases

i, refers to individual noble gas nuclide

(Refer to Table 2.4-5 for the noble gas nuclides considered)

$Q_T$  = the total noble gas release rate (Ci/sec)

=  $\sum_i Q_i$  sum of the individual noble gas radionuclides determined to be present by isotopic analysis

$\bar{K}$  = the average total body dose factor due to gamma emission (rem/yr per Ci/sec)

$\bar{L}$  = the average skin dose factor due to beta emissions (rem/yr per Ci/sec)

$\bar{M}$  = the average air dose factor due to beta emissions (rad/yr per Ci/sec)

$\bar{N}$  = the average air dose factor due to gamma emissions (rad/yr per Ci/sec)

The values of  $\bar{K}$ ,  $\bar{L}$ ,  $\bar{M}$  and  $\bar{N}$  are to be determined each time isotopic analysis is required as delineated in Specification 2.4.2.J. Determine the following using the results of the noble gas radionuclide analysis:

$$\bar{K} = (1/Q_T) \sum_i Q_i K_i$$

$$\bar{L} = (1/Q_T) \sum_i Q_i L_i$$

$$\bar{M} = (1/Q_T) \sum_i Q_i M_i$$

$$\bar{N} = (1/Q_T) \sum_i Q_i N_i$$

where the values of  $K_i$ ,  $L_i$ ,  $M_i$  and  $N_i$  are provided in Table 2.4-5 and are site dependent gamma and beta dose factors.

Table 2.4-5

GAMMA AND BETA DOSE FACTORS FOR CRYSTAL RIVER UNIT 3

$x/Q = 1.46 \times 10^6 \text{ sec/m}^3$  at 1450 meters, ENE

Noble Gas Radionuclide	Dose Factors for Vent			
	$K_{iv}$	$L_{iv}$	$M_{iv}$	$N_{iv}$
	Total Body $\frac{\text{rem/yr}}{\text{Ci/sec}}$	Skin $\frac{\text{rem/yr}}{\text{Ci/sec}}$	Beta Air $\frac{\text{rad/yr}}{\text{Ci/sec}}$	Gamma Air $\frac{\text{rad/yr}}{\text{Ci/sec}}$
Kr-83m	$7.0 \times 10^{-5}$	0	0.92	0.035
Kr-85m	0.80	2.1	2.9	0.84
Kr-85	0.0096	2.0	2.8	0.010
Kr-87	2.5	14	15	2.6
Kr-88	6.1	3.5	4.3	6.4
Kr-89	2.79	15	15	0.83
Xe-131m	2.28	0.69	1.6	0.35
Xe-133m	0.22	1.5	2.2	0.29
Xe-133	0.26	0.55	1.5	0.31
Xe-135m	1.2	1.0	1.1	1.1
Xe-135	1.2	2.7	3.6	1.3
Xe-137	0.12	18	19	0.12
Xe-138	2.4	6.0	6.9	2.5



Q = The measured release rate of the radioiodines and radioactive materials in particulate forms with half-lives greater than eight days. (Ci/sec)

- A. (1) The release rate limit of noble gases from the site shall be such that

$$2.0 (Q_{TV} \bar{K}_V) \leq 1$$

and

$$0.33 (Q_{TV} (\bar{L}_V + 1.1 \bar{N}_V)) \leq 1$$

- (2) The release rate limit of all radioniodines and radioactive materials in particulate form with half-lives greater than eight days, released to the environs as part of the gaseous wastes from the site shall be such that

$$3.5 \times 10^4 Q_V \leq 1$$

- B. (1) The average release rate of noble gases from the site during any calendar quarter shall be such that

$$13 (Q_{TV} \bar{N}_V) \leq 1$$

and

$$6.3 (Q_{TV} \bar{M}_V) \leq 1$$

- (2) The average release rate of noble gases from the site during any 12 consecutive months shall be

$$25 (Q_{TV} \bar{N}_V) \leq 1$$

$$13 (Q_{TV} \bar{M}_V) \leq 1$$

- (3) The average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter shall be such that

$$13 (3.5 \times 10^4 Q_V) \leq 1$$

- (4) The average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any period of 12 consecutive months shall be that

$$25 (3.5 \times 10^4 Q_V) \leq 1$$



- (5) The amount of iodine-131 released during any calendar quarter shall not exceed 2 Ci/reactor.
  - (6) The amount of iodine-131 released during any period of 12 consecutive months shall not exceed 4 Ci/reactor.
- C. Should any of the conditions of 2.4.2.C(1), (2) or (3) listed below exist, the licensee shall make an investigation to identify the causes of the release rates, define and initiate a program of action to reduce the release rates to design objective levels listed in Section 2.4, and report these actions to the NRC within 30 days from the end of the quarter during which the releases occurred.
- (1) If the average release rate of noble gases from the site during any calendar quarter is such that
 
$$50 (Q_{TV} \bar{N}_V) > 1$$
 or
 
$$25 (Q_{TV} \bar{M}_V) > 1$$
  - (2) If the average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter is such that
 
$$50 (3.5 \times 10^4 Q_V) > 1$$
  - (3) If the amount of iodine-131 released during any calendar quarter is greater than 0.5 Ci/reactor.
- D. During the release of gaseous wastes from the primary system waste gas holdup system the effluent monitor for the Waste Gas Storage Tanks shall be operated and set to alarm and to initiate the automatic closure of the waste gas discharge valve prior to exceeding the limits specified in 2.4.2.A above. The operability of each automatic isolation valve listed in Table 2.4-4 shall be demonstrated quarterly.
- E. The maximum activity to be contained in one waste gas storage tank shall not exceed 47,000 Curies (considered as Xe-133).

## 2. Maximum Permissible Concentrations

The maximum permissible concentrations of nuclides in gaseous releases is based on the resultant doses at the site boundary as determined from the concentrations of nuclides at the release point. The Technical Specifications provide the equations and dose factors that relate the gaseous activity to be released to doses at the site boundary and restrictions are placed on instantaneous, quarterly and yearly release rates. The gaseous releases do not exceed the concentration limits specified in 10 CFR 20 and are as low as reasonably achievable in accordance with the requirements of 10 CFR 50.

## 3. Measurements and Approximations of Total Radioactivity

The gaseous effluent release via the Auxiliary Building Exhaust is treated as a continuous release subdivided into discrete periods of filter changes and the radioactivity measured as follows:

- A. Fission and Activation Gases - The total activity released is determined from the net count rate of the gaseous monitor (RMA-2G), its calibration factor, and the total exhaust flow. The activity of radiogas is determined by the isotopic distribution of radiogas in the analysis of the Auxiliary Building vent for that period.
- B. Iodines - The activity released as Iodine-131, 133, and 135 is based on the charcoal cartridge activities (RMA-2I), the particulate filters activities (RMA-2P) and the total vent flow.
- C. Particulates - The activity released via particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters (RMA-2P) and the total vent flow.
- D. Tritium - The activity released as tritium is based on monthly grab sample analysis and total vent flow.

The radioactivity released by batch releases of the Waste Gas Decay Tanks via the Auxiliary Building Exhaust is measured as follows:

- A. Fission and Activation Gases - The activity released is based on the volume released and the activity of the individual nuclides obtained from an isotopic analysis of a grab sample taken prior to the release.
- B. Iodines - The iodines from batch releases are included in the iodine determination from the continuous Auxiliary Building releases.
- C. Particulates - The particulates from batch releases are included in the particulate determination from the continuous Auxiliary Building release.
- D. Tritium - The activity released as tritium is based on a grab sample analysis of each batch and the batch volume.

The radioactivity released by purge releases of the Reactor Building through the Reactor Building vent is measured as follows:

- A. Fission and Activation Gases - The activity released is determined from the net count rate of the gaseous monitor (RMA-1G), the monitor calibration factor and the total vent flow. The release of each radiogas is a product of the total curies released times the fraction of that radiogas in the isotopic analysis for that purge.
- B. Iodines - The total curies released as iodine-131, 133 and 135 was determined from the charcoal cartridge activities (RMA-1I) and the particulate filter activities (RMA-1P).
- C. Particulate - The total curies released via particulates with half-lives greater than eight days is determined by isotopic analysis of each purge particulate filter (RMA-1P).
- D. Tritium - The total curies released as tritium is based on grab samples taken for each purge (or the average if more than one grab sample was taken).

Estimated errors are based on errors in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, nonsteady release rates, chemical yield factors and sample losses for such items as charcoal cartridges.

- A. Fission and Activation Gas Total Release as calculated from process monitor readings and grab sample isotopics.

Monitor Statistical Error	30%
Monitor Error in Calibration	50%
Vent Flow Rate	10%
Non-Steady Release Rate	20%
	<u>110%</u>

- B. I-131 Total Release as calculated from charcoal and particulate filter activity.

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rate	10%
Vent Sample Flow Rate	10%
Non-Steady Release Rate	10%
Losses from Charcoal Cartridge	10%
	<u>110%</u>

- C. Particulates with half-lives greater than eight days release as calculated from particulate filter activities.

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rate	10%
Vent Sample Flow Rate	10%
Non-Steady Release Rate	10%
	<u>100%</u>

- D. Total Tritium release as calculated from periodic grab sample analyses.

Water Vapor in Sample Stream	
Determination	20%
Vent Flow Rate	10%
Counting Calibration and Statistics	10%
Non-Steady Release Rate	50%
	<u>90%</u>

#### 4. Batch and Unplanned Releases

The batch gaseous effluent releases may be summarized as follows:

	First Quarter	Second Quarter
Number of Batch Releases	1.80E+01	1.50E+01
Total time for all releases (minutes)	1.06E+04	5.41E+03
Maximum time for any one release (minutes)	1.03E+03	7.60E+02
Average time for all releases (minutes)	5.87E+02	3.61E+02
Minimum time for any one release (minutes)	2.00E+02	1.00E+00
Number of Unplanned Releases	0.00E+00	5.00E+00
Total Unplanned Activity Released (Curies)	0.00E+00	4.78E+01

The summation of gaseous effluent releases is in Table II-1 and the summation of nuclides in gaseous effluent ground level releases is in Table II-2.

The unplanned releases for the third and fourth quarters of 1983 are listed below giving the date, the Nonconforming Operations Report Number, and the cause of each release.

<u>Date</u>	<u>NCOR #</u>	<u>Description</u>
4-10-84	84-93	Auxiliary Building ventilation monitor (RM-A2) high alarm
4-12-84	84-97	Auxiliary Building ventilation monitor (RM-A2) high alarm during Waste Gas Decay Tank Release
4-14-84	84-987	Auxiliary Building ventilation monitor (RM-A2) high alarm due to blown loop seals in the Waste Gas Header
4-26-84	84-111	Possible unmonitored release from the steam relief valves during a plant trip.
5-2-84	84-114	Auxiliary Building ventilation monitor (RM-A2) high alarm while sampling Waste Gas Decay Tank



TABLE II-1

## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1/1/84 - 6/30/84

## GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est.Total Error %
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## A. Fission and Activation Gases

1. Total Release	Ci	6.36E+02	4.21E+02	1.10E+02
2. Average Release Rate for Period	$\mu\text{Ci/sec}$	8.09E+01	5.36E+01	
3. Percent of Technical Specification Limit	%	8.19E-02	5.59E-02	

## B. Iodines

1. Total Iodine - 131	Ci	9.89E-06	3.56E-05	1.01E+02
2. Average Release Rate for Period	$\mu\text{Ci/sec}$	1.00E-6	4.53E-06	
3. Percent of Technical Specification Limit	%	4.95E-04	1.78E-03	

## C. Particulates

1. Particulates with half-lives > 8 days	Ci	5.85E-06	7.89E-06	1.00E+02
2. Average Release Rate for Period	$\mu\text{Ci/sec}$	7.45E-07	1.00E-06	
3. Percent of Technical Specification Limit	%	3.39E-05	4.55E-05	
4. Gross Alpha Radioactivity	Ci	8.44E-08	1.18E-07	

## D. Tritium

1. Total Release	Ci	8.89E-01	6.71E+00	9.00E+01
2. Average Release Rate for Period	$\mu\text{Ci/sec}$	1.13E-01	8.54E-01	
3. Percent of Technical Specification Limit	%	N/A	N/A	



TABLE II-2

## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1/1/84 - 6/30/84

## GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

## CONTINUOUS MODE

## BATCH MODE

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
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## 1. Fission gases

krypton-85	Ci	<1.57E+03	<1.52E+03	1.53E+00	2.67E-01
krypton-85m	Ci	2.70E-01	<2.79E+01	1.98E-02	2.01E-01
krypton-87	Ci	<1.20E+01	4.66E-02	<5.78E-03	1.79E-02
krypton-88	Ci	6.14E-01	<1.39E+01	6.79E-03	1.34E-01
krypton-89	Ci	<2.08E+04	<1.69E+04	<1.02E+01	<2.62E+01
xenon-133	Ci	4.46E+02	2.40E+02	1.48E+02	1.47E+02
xenon-135	Ci	3.12E+01	2.68E+01	1.90E-01	3.57E+00
xenon-135m	Ci	3.60E+00	<1.90E+01	<1.15E-02	<2.48E-02
xenon-137	Ci	<4.68E+03	<3.94E+03	<1.81E+00	<3.92E+00
xenon-138	Ci	<1.06E+02	<8.77E+01	<3.80E-02	<1.24E-01
argon-41	Ci	<9.14E+00	<6.42E+00	<4.49E-03	2.06E-02
xenon-133m	Ci	8.41E-01	<3.27E+01	7.12E-01	9.13E-01
xenon-131m	Ci	2.10E+00	<1.66E+02	1.35E+00	2.31E+00
unidentified	Ci				
Total for Period	Ci	4.84E+02	2.67E+02	1.51E+02	1.54E+02

## Iodines

iodine-131	Ci	9.89E-06	3.56E-05	<4.62E-06	<1.08E-06
iodine-133	Ci	<6.72E-05	4.13E-05	<6.20E-06	<3.92E-06
iodine-135	Ci	<1.26E-01	<1.32E-01	<7.89E-05	<3.52E-04
Total for Period	Ci	9.89E-06	7.68E-05	<8.97E-05	<3.57E-04

## 3. Particulates

strontium-89	Ci	<4.80E-07	<8.91E-07		<3.78E-09
strontium-90	Ci	<4.75E-07	<7.83E-07		<4.25E-09
cesium-134	Ci	<6.93E-07	<5.57E-07	<2.84E-06	1.30E-06
cesium-137	Ci	1.16E-07	<1.05E-06	4.94E-06	4.30E-06
barium-lathanum 140	Ci	<1.59E-06	<1.36E-06	<2.71E-06	<1.05E-06
cobalt-57	Ci	<1.28E-07	<2.13E-07	<4.63E-07	<1.38E-07
cobalt-58	Ci	<9.19E-07	<7.67E-07	<1.70E-06	<6.29E-07
cobalt-60	Ci	7.22E-07	1.30E-07	<2.92E-06	<1.51E-06
chromium-51	Ci	<3.93E-06	<4.68E-06	<6.60E-06	<3.77E-06
manganese-54	Ci	<7.77E-07	<6.96E-07	<1.23E-06	2.01E-06
iron-59	Ci	<2.67E-06	<2.00E-06	<4.67E-06	<1.79E-06
zinc-65	Ci	<1.91E-06	<1.64E-06	<4.75E-06	<1.24E-06
niobium-95	Ci	<8.57E-07	<7.15E-07	<1.59E-06	<4.24E-07
zirconium-95	Ci	<1.25E-06	1.52E-07	<2.82E-06	<1.27E-06
silver-110m	Ci	<1.29E-06	<1.08E-06	<1.81E-06	<1.33E-06
antimony-126	Ci	<7.55E-07	<7.45E-07	<1.03E-06	<5.65E-07
cerium-141	Ci	7.60E-08	<5.40E-07	<1.34E-06	<3.77E-07
iodine-131	Ci	<5.87E-07	<6.54E-07	<2.43E-06	<7.52E-07
Total	Ci	1.92E-07	2.82E-07	4.94E-06	5.60E-06

TABLE II-3  
Doses to Individuals from Continuous Gaseous Effluent Releases

FIRST QUARTER

Beta Air Dose =  $1.77\text{E-}03$  mrad/yr (4.0 miles, E)

Gamma Air Dose =  $8.24\text{E-}04$  mrad/yr (4.0 miles, E)

<u>Pathway</u>	<u>Whole Body Dose</u>			<u>Organ Dose</u>			
	<u>Distance (Mi.) and Direction</u>	<u>Age Group</u>	<u>Dose (mrem/yr)</u>	<u>Distance (Mi.) and Direction</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose (mrem/yr)</u>
Plume Immersion	4.00 at E	Each	$5.04\text{E-}04$	4.00 at E	Each	Skin	$1.29\text{E-}03$
Ground Contamination	4.00 at E	Each	$6.40\text{E-}07$	4.00 at E	Each	Skin	$7.52\text{E-}07$
Inhalation	4.00 at E	Teen	$3.59\text{E-}06$	4.00 at E	Teen	Thyroid	$3.99\text{E-}06$
Vegetable Consumption	4.00 at E	Child	$6.99\text{E-}06$	4.00 at E	Child	Thyroid	$1.59\text{E-}05$
Cow Milk Consumption	4.00 at E	Infant	$4.38\text{E-}06$	4.00 at E	Infant	Thyroid	$1.86\text{E-}04$
Goat Milk Consumption	4.00 at E	Infant	$8.74\text{E-}06$	4.00 at E	Infant	Thyroid	$2.26\text{E-}04$
Meat Consumption	4.00 at E	Adult	$5.69\text{E-}07$	4.00 at E	Adult	Thyroid	$1.43\text{E-}06$
14 Total	4.00 at E	Child	$5.24\text{E-}04$	4.00 at E	Infant	Skin	$1.31\text{E-}03$

SECOND QUARTER

Beta Air Dose =  $7.27\text{E-}04$  mrad/yr (4.0 miles, E)

Gamma Air Dose =  $3.11\text{E-}04$  mrad/yr (4.0 miles, E)

<u>Pathway</u>	<u>Whole Body Dose</u>			<u>Organ Dose</u>			
	<u>Distance (Mi.) and Direction</u>	<u>Age Group</u>	<u>Dose (mrem/yr)</u>	<u>Distance (Mi.) and Direction</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose (mrem/yr)</u>
Plume Immersion	4.00 at E	Each	$1.91\text{E-}04$	4.00 at E	Each	Skin	$5.24\text{E-}04$
Ground Contamination	4.00 at E	Each	$1.21\text{E-}07$	4.00 at E	Each	Skin	$1.43\text{E-}07$
Inhalation	4.00 at E	Teen	$1.95\text{E-}05$	4.00 at E	Teen	Thyroid	$2.08\text{E-}05$
Vegetable Consumption	4.00 at E	Child	$3.77\text{E-}05$	4.00 at E	Child	Thyroid	$7.05\text{E-}05$
Cow Milk Consumption	4.00 at E	Infant	$2.33\text{E-}05$	4.00 at E	Infant	Thyroid	$6.84\text{E-}04$
Goat Milk Consumption	4.00 at E	Infant	$4.67\text{E-}05$	4.00 at E	Infant	Thyroid	$8.39\text{E-}04$
Meat Consumption	4.00 at E	Adult	$3.06\text{E-}06$	4.00 at E	Adult	Thyroid	$6.18\text{E-}06$
Total	4.00 at E	Child	$2.94\text{E-}04$	4.00 at E	Infant	Thyroid	$1.72\text{E-}03$

TABLE II-4  
Doses to Individuals from Batch Gaseous Effluent Releases

FIRST QUARTER  
Beta Air Dose =  $1.04\text{E-}03$  mrad/yr (4.0 miles, E)  
Gamma Air Dose =  $3.44\text{E-}04$  mrad/yr (4.0 miles, E)

Pathway	Whole Body Dose			Organ Dose			
	Distance (Mi.) and Direction	Age Group	Dose (mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ	Dose (mrem/yr)
Plume Immersion	4.00 at E	Each	$2.01\text{E-}04$	4.00 at E	Each	Skin	$5.85\text{E-}04$
Ground Contamination	4.00 at E	Each	$1.74\text{E-}06$	4.00 at E	Each	Skin	$2.03\text{E-}06$
Inhalation	4.00 at E	Adult	$1.07\text{E-}08$	4.00 at E	Child	Bone	$2.21\text{E-}08$
Vegetable Consumption	4.00 at E	Adult	$1.01\text{E-}06$	4.00 at E	Child	Bone	$4.23\text{E-}06$
Cow Milk Consumption	4.00 at E	Adult	$8.45\text{E-}07$	4.00 at E	Infant	Liver	$7.70\text{E-}06$
Goat Milk Consumption	4.00 at E	Adult	$2.54\text{E-}06$	4.00 at E	Infant	Liver	$2.31\text{E-}05$
Meat Consumption	4.00 at E	Adult	$9.99\text{E-}08$	4.00 at E	Child	Bone	$1.70\text{E-}07$
Total	4.00 at E	Adult	$2.07\text{E-}04$	4.00 at E	Each	Skin	$5.87\text{E-}04$

SECOND QUARTER  
Beta Air Dose =  $2.78\text{E-}04$  mrad/yr (4.0 miles, E)  
Gamma Air Dose =  $1.02\text{E-}04$  mrad/yr (4.0 miles, E)

Pathway	Whole Body Dose			Organ Dose			
	Distance (Mi.) and Direction	Age Group	Dose (mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ	Dose (mrem/yr)
Plume Immersion	4.00 at E	Each	$6.07\text{E-}05$	4.00 at E	Each	Skin	$1.70\text{E-}04$
Ground Contamination	4.00 at E	Each	$1.63\text{E-}06$	4.00 at E	Each	Skin	$1.90\text{E-}06$
Inhalation	4.00 at E	Adult	$4.31\text{E-}08$	4.00 at E	Teen	Liver	$4.63\text{E-}08$
Vegetable Consumption	4.00 at E	Adult	$1.13\text{E-}06$	4.00 at E	Child	Liver	$4.09\text{E-}06$
Cow Milk Consumption	4.00 at E	Adult	$9.48\text{E-}07$	4.00 at E	Infant	Liver	$7.65\text{E-}06$
Goat Milk Consumption	4.00 at E	Adult	$2.83\text{E-}06$	4.00 at E	Infant	Liver	$2.29\text{E-}05$
Meat Consumption	4.00 at E	Adult	$1.16\text{E-}07$	4.00 at E	Child	Liver	$1.68\text{E-}07$
Total	4.00 at E	Adult	$6.74\text{E-}05$	4.00 at E	Each	Skin	$1.72\text{E-}04$

TABLE II-5

## Doses to the Population from Continuous Gaseous Effluent Releases

<u>FIRST QUARTER</u>			
<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ</u>	<u>Organ Dose (Man-Rem)</u>
Plume Immersion	6.50E-03	Skin	2.17E-02
Ground Contamination	5.77E-06	Skin	6.55E-06
Inhalation	8.00E-05	Thyroid	8.74E-05
Vegetable Consumption	4.32E-05	Thyroid	1.47E-04
Milk Consumption	1.09E-05	Thyroid	7.77E-05
Meat Consumption	9.28E-06	Thyroid	1.63E-05
Total	6.65E-03	Skin	2.18E-02

<u>SECOND QUARTER</u>			
<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ</u>	<u>Organ Dose (Man-Rem)</u>
Plume Immersion	2.78E-03	Skin	9.30E-03
Ground Contamination	1.10E-06	Skin	1.30E-06
Inhalation	4.04E-04	Thyroid	4.26E-04
Vegetable Consumption	2.57E-04	Thyroid	7.31E-04
Milk Consumption	5.10E-05	Thyroid	3.01E-04
Meat Consumption	5.21E-05	Thyroid	8.34E-05
Total	3.54E-03	Skin	1.01E-02



TABLE II-6

## Doses to the Population from Batch Gaseous Effluent Releases

<u>FIRST QUARTER</u>			
<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ</u>	<u>Organ Dose (Man-Rem)</u>
Plume Immersion	1.70E-03	Skin	6.02E-03
Ground Contamination	1.20E-05	Skin	1.40E-05
Inhalation	8.72E-08	Liver	1.62E-07
Vegetable Consumption	3.05E-06	Liver	7.20E-06
Milk Consumption	1.14E-06	Liver	3.00E-06
Meat Consumption	4.70E-07	Liver	8.96E-07
Total	1.71E-03	Skin	6.04E-03
<u>SECOND QUARTER</u>			
<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ</u>	<u>Organ Dose (Man-Rem)</u>
Plume Immersion	9.88E-04	Skin	3.39E-03
Ground Contamination	1.38E-05	Skin	1.61E-05
Inhalation	9.88E-07	Liver	1.03E-06
Vegetable Consumption	6.35E-06	Liver	1.32E-05
Milk Consumption	1.67E-06	Liver	3.83E-06
Meat Consumption	9.40E-07	Liver	1.57E-06
Total	1.01E-03	Skin	3.40E-03

### III. RELEASES OF AND DOSES FROM LIQUID EFFLUENTS

There are three sources of liquid effluents released to the discharge canal: 1) the Laundry and Shower Sump Tanks, 2) the Evaporator Condensate Storage Tanks and 3) the Regeneration Waste Neutralization Tank. The Laundry and Evaporator Condensate are batch type releases made through the plant liquid release monitor RML-2. The Regeneration Waste Tank discharges are continuous type releases made through the plant liquid release monitor RML-7.

#### 1. Regulatory Limits

The Technical Specification limits for liquid effluent releases are as follows:

##### Specification 2.4.1

- A. The instantaneous concentration of radioactive materials released in liquid waste effluents from all reactors at the site shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted areas.
- B. The cumulative release of radioactive materials in liquid waste effluents excluding tritium and dissolved gases, shall not exceed 10 Ci/reactor/calendar quarter.
- C. The cumulative release of radioactive materials in liquid waste effluents excluding tritium and dissolved gases, shall not exceed 20 Ci/reactor in any 12 consecutive months.
- D. During release of radioactive wastes, the effluent control monitor shall be set to alarm and to initiate the automatic closure of each waste isolation valve prior to exceeding the limits specified in 2.4.1.A above.
- E. The operability of each automatic isolation valve in the liquid radwaste discharge lines shall be demonstrated quarterly.
- F. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when the projected cumulative release could exceed 1.25 Ci/reactor/calendar quarter, excluding tritium and dissolved gases.
- G. The maximum radioactivity to be contained in any liquid radwaste tank that can be discharged directly to the environs shall not exceed 10 Ci, excluding tritium and dissolved gases.
- H. If the cumulative release of radioactive materials in liquid effluents, excluding tritium and dissolved gases, exceeds 2.5 Ci/reactor/calendar quarter, the licensee shall make an investigation to identify the causes for such releases, define and



initiate a program of action to reduce such releases to the design objective levels listed in Section 2.4, and a report of these actions shall be made to the USNRC in accordance with Section 5.6.2.C(1).

## 2. Maximum Permissible Concentrations

The maximum permissible concentration values used in determining allowable liquid radwaste release concentrations are taken from 10 CFR Part 20, Appendix B, Table II, Column 2. Release rate and dilution ratio for each batch are determined by a mixed nuclide MPC calculation performed before the release of the batch. To facilitate the measurements and calculations, the nuclides of Column 2 which can be produced in a fission reactor have been grouped according to MPC value and type of radiation as shown in Figure III-1.

The concentration of each of the 23 gamma emitting nuclides specifically noted in Figure III-1 is measured individually because of interest in that nuclide. For any of the 23 nuclides not detected in the gamma scan, the MDA Limit is computed from the measured data for that sample.

Only two pure beta emitters, Sr-89 and Sr-90, have MPC values less than  $9 \times 10^{-6}$   $\mu\text{Ci/ml}$ . Individual measurements are made on proportional composite liquid radwaste samples to determine the Sr-89 and Sr-90 concentration or MDA value to be applied to individual batch release calculations.

Although the MPC limit for tritium is greater than  $9 \times 10^{-6}$   $\mu\text{Ci/ml}$ , a separate measurement is made for tritium. A distillation and liquid scintillation counting technique is used to measure tritium concentration.

The measured and calculated concentration values for each batch are used to calculate the dilution ratio, release rate, and dilution rate prior to release of each batch. Both the concentration and release data are stored on a computer disc file. The disc file data is used to assure that quarterly and annual release limits are not exceeded. Bases used for the data of Table III-1 are as follows:

- A. Fission and activation products - The total release values (not including tritium, gases, alpha) are comprised of the sum of the individual radionuclide activities in each batch released to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent. Percent of applicable limit is determined from a mixed nuclide MPC calculation. The average concentration for each nuclide summed over all batches is divided by the corresponding individual MPC value. The sum over all nuclides of the C/MPC ratios times 100 is the percent of applicable limit for effluent releases during the quarter.
- B. Tritium - The measured tritium concentration in a composite sample is used to calculate the total release and average diluted concentration during each period. Average diluted concentration divided by the MPC

limit,  $3 \times 10^{-3} \mu\text{Ci/ml}$ , is converted to percent to give the percent of applicable limit.

- C. Dissolved and entrained gases - Concentrations of dissolved and entrained gases in liquid effluents are measured by Ge(Li) spectroscopy on a sample from each liquid radwaste batch. Dissolved and entrained gases for which measured or MDA concentrations are determined include noble gases with half lives greater than 8 hours: Xe-135, Xe-133m, Xe-133, and Kr-85. Iodine radionuclides in any form are determined during the isotopic analysis for each batch, therefore a separate analysis for possible gaseous forms is not performed because it would not provide additional information.

A conservative release limit, the maximum sensitivity limit of  $4 \times 10^{-5} \mu\text{Ci/ml}$  of each dissolved and entrained gaseous radionuclide as specified in Table Note 5, Table 2.4-1, Environmental Technical Specifications, has been applied in determining the percent of applicable limit.

### 3. Measurements and Approximations of Total Radioactivity

Details of the analytical procedures for liquid radwaste analysis are as follows:

	<u>Measurement</u>	<u>Frequency</u>	<u>Method</u>
1.	Gamma Isotopic	Each Batch	Ge(Li) spectrometry with on-line computer
2.	Gross Beta	Each Batch	Liquid scintillation
3.	Sr-89	Monthly Composite	Chemical separation and beta scintillation counting
4.	Sr-90	Monthly Composite	Chemical separation and beta scintillation counting
5.	Tritium	Monthly Composite	Distillation and liquid scintillation counting
6.	Alpha	Monthly Composite	Alpha scintillation counting
7.	Dissolved Gases	Each Batch	Ge(Li) spectrometry with on-line computer

Estimated errors are based on errors in counting equipment calibration, counting statistics, nonsteady release flow rate, chemical yield factors, sampling and mixing losses, and volume determinations.

- A. Fission and Activation Products Total Release as calculated for each batch.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

B. Total Tritium Release as calculated from a monthly composite.

Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>40%</u>

C. Dissolved and Entrained Gases Total Release as calculated from one batch per month.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

D. Total Gross Alpha Radioactivity Release as calculated from a monthly composite.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

4. Batch and Unplanned Releases

The batch liquid effluent releases may be summarized as follows:

	<u>First Quarter</u>	<u>Second Quarter</u>
Number of Batch Releases	1.87E+02	1.37E+02
Total Time for all Releases (minutes)	1.15E+04	9.83E+03
Maximum Time for any one Release (minutes)	2.00E+02	3.46E+02
Average Time for all Releases (minutes)	6.20E+01	7.20E+01
Minimum time for any one Release (minutes)	5.00E+00	3.00E+00
Average dilution flow of Units 1, 2, and 3 during all Releases (liters/minutes)	4.89E+06	4.91E+06
Number of Unplanned Releases	0.00E+00	0.00E+00
Total Unplanned Activity Releases (Curie)	0.00E+00	0.00E+00

The summation of liquid effluent releases is in Table III-1 and the summation of nuclides in liquid effluent releases is in Table III-2. These releases are based on the dilution of the radioactive liquid effluent by the condenser cooling and nuclear services water of Unit 3.

The doses to individuals from liquid effluent releases are in Table III-3 and the doses to the population from liquid effluent releases are in Table III-4. These doses are based on the dilution of the radioactive liquid effluents by the condenser cooling water of Units 1, 2, and 3.

There were no unplanned releases for the first and second quarters of 1984.

Figure III-1

## METHODS OF MEETING 10 CFR 20, APPENDIX B, TABLE II, COLUMN 2 MPC LIMITS

MPC RANGE ( $\mu\text{Ci/ml}$ )	GAMMA-RAY EMITTERS	BETA EMITTERS	ALPHA EMITTERS
$<9 \times 10^{-6}$	<u>I-131, I-132, I-133</u>	Sr-89, Sr-90	
	<u>I-135, Cs-134</u>	(Separation and Beta Scintillation Counting)	
	(Ge(Li) Gamma-Ray Spectroscopy)		<u>All</u> (Alpha Scintillation Counting Sensitivity $10^{-7} \mu\text{Ci/ml}$ as Pu-239)
$>9 \times 10^{-6}$	<u>Ba-La-140, Na-24, Cu-64</u>	<u>Tritium</u>	
	<u>Co-60, Fe-59, Zn-65</u>	(Distillation and Liquid Scintillation Counting $10^{-5} \mu\text{Ci/ml}$ )	
	<u>Ag-110m, Mn-54, Co-58</u>		
	<u>Zr-Nb-95, Cs-Ba-137</u>		
	<u>As-76, F-18, Cr-51</u>	<u>All others</u>	
	<u>Np-239, Ce-141</u>	(Liquid Scintillation Counting $10^{-5} \mu\text{Ci/ml}$ as Cs-137)	
	<u>Mo-Tc-99, Ce-Pr-144</u>		
	(Ge(Li) Gamma-Ray Spectroscopy)		



TABLE III-1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1/1/84 - 6/30/84  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est.Total Error %
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## A. Fission and Activation Products

1. Total Release (not including tritium, gases, alpha)	Ci	3.19E-02	4.31E-02	1.00E+02
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	3.89E-08	5.67E-08	
3. Percent of applicable limit	%	2.90E-01	7.15E-01	

## B. Tritium

1. Total Release, Batch Mode	Ci	1.41E+02	1.11E+02	4.00E+01
2. Average diluted concentration during period	$\mu\text{Ci/ml}$	1.73E-04	1.46E-04	
3. Percent of applicable limit	%	5.76E+00	4.87E+00	
4. Total release, Continuous Mode	Ci	7.26E-02	1.20E-01	4.00E+01

## C. Dissolved and entrained gases

1. Total release	Ci	4.30E+00	2.68E+00	1.00E+02
2. Average diluted concentration during period, Batch Mode	$\mu\text{Ci/ml}$	5.26E-06	3.52E-06	
3. Percent of applicable limit, Batch Mode	%	1.31E+01	8.80E+00	

## D. Gross alpha radioactivity

1. Total release	Ci	1.61E-05	7.86E-05	1.00E+02
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## E. Volume of Waste released (prior to dilution)

1. Batch and Continuous Modes	liters	1.45E+07	1.76E+07	1.00E+01
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## F. Volume of dilution water used during period

1. Batch and Continuous Modes	liters	8.04E+08	7.43E+08	1.00E+01
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TABLE III-2

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1/1/84 - 6/30/84

## LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
strontium-89	Ci	7.87E-06	<2.86E-05	1.27E-05	1.09E-04
strontium-90	Ci	<2.02E-05	<2.92E-05	2.54E-05	3.66E-05
cesium-134	Ci	3.85E-06	2.39E-06	6.38E-03	1.10E-03
cesium-137	Ci	<2.56E-04	<3.30E-04	3.35E-03	6.60E-04
iodine-131	Ci	5.36E-06	<2.07E-04	2.27E-04	7.01E-04
cobalt-58	Ci	<1.78E-04	<2.21E-04	4.51E-04	2.75E-03
cobalt-60	Ci	5.40E-05	<3.70E-04	3.35E-03	8.06E-03
iron-59	Ci	<4.64E-04	<6.30E-04	<1.82E-04	<2.74E-04
zinc-65	Ci	<3.61E-04	<4.42E-04	<1.93E-04	5.34E-07
manganese-54	Ci	<1.84E-04	<2.24E-04	1.39E-04	1.11E-04
chromium-51	Ci	<1.29E-03	6.85E-05	<1.17E-03	4.88E-05
zirconium-niobium-95	Ci	<4.07E-04	<5.44E-04	8.40E-05	4.48E-03
molybdenum-99	Ci	<1.14E-03	<1.40E-03	3.84E-05	<1.17E-03
technetium-99m	Ci	<1.34E-04	<1.69E-04	<2.05E-04	9.16E-06
barium-lanthanum-140	Ci	<7.85E-04	<1.06E-03	1.39E-04	1.18E-03
cerium-141	Ci	<2.63E-04	<3.18E-04	<4.44E-04	<4.41E-04
antimony-126	Ci			5.11E-08	
sodium-24	Ci	<2.05E-04	<2.69E-04	1.26E-05	4.42E-06
copper-64	Ci	<4.31E-02	<5.61E-02	<1.48E-02	3.68E-04
iodine-135	Ci	<7.01E-04	<9.10E-04	4.76E-05	5.88E-06
silver-110m	Ci	<2.52E-04	6.58E-06	3.41E-04	2.14E-02
iodine-132	Ci	<1.92E-04	<2.58E-04	1.61E-04	<1.08E-04
arsenic-76	Ci	1.50E-05	<3.75E-04	1.47E-06	<3.46E-04
iodine-133	Ci	7.36E-06	<2.11E-04	1.06E-04	2.69E-04
neptunium-239	Ci	2.74E-05	<1.12E-03	<7.92E-04	<9.48E-04
cerium-144	Ci	<1.05E-03	<1.28E-03	7.17E-04	2.64E-04
zirconium-niobium-97	Ci			1.68E-08	5.67E-06
cesium-136	Ci			6.41E-07	2.52E-04
cobalt-57	Ci				
tungsten-187	Ci		1.63E-05	1.22E-06	
ruthenium-103	Ci				
antimony-125	Ci			1.36E-02	1.11E-03
antimony-124	Ci			2.69E-03	5.24E-05
niobium - 95m	Ci			5.79E-05	6.44E-05
rubidium 88	Ci			1.05E-05	3.01E-06
unidentified	Ci	. E	. E	. E	. E
Total for period (above)	Ci	1.21E-04	9.38E-05	3.17E-02	4.30E-02

TABLE III-2 (Continued)

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1/1/84 - 6/30/84

## LIQUID EFFLUENTS

Dissolved & Entrained Gases	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
xenon-133	Ci	1.19E-03	1.06E-03	4.21E+00	2.60E+00
xenon-135	Ci	1.02E-04	2.46E-04	4.42E-02	2.96E-02
xenon 133m	Ci	<1.30E-03	<1.64E-03	4.71E-02	3.97E-02
krypton-85	Ci	<4.93E-02	2.42E-03	5.97E-03	9.02E-04
krypton-85m	Ci	<1.56E-04	<2.02E-04	4.76E-05	3.87E-05
xenon-131m	Ci	<6.80E-03	<7.90E-03	<1.28E-02	<1.22E-02

TABLE III-3

## Doses to Individuals from Liquid Effluent Releases

FIRST QUARTER - CONTINUOUS RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		
	<u>Age Group</u>	<u>Dose</u> <u>(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose</u> <u>(mrem/yr)</u>
Fish	Adult	1.74E-06	Adult	GI-LLI	7.60E-06
Invertebrates	Child	2.30E-06	Adult	GI-LLI	1.71E-05
Shoreline Use	Teen	7.98E-06	Teen	Skin	9.39E-06
Total	Teen	1.15E-05	Adult	GI-LLI	2.61E-05

SECOND QUARTER - CONTINUOUS RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		
	<u>Age Group</u>	<u>Dose</u> <u>(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose</u> <u>(mrem/yr)</u>
Fish	Adult	9.20E-07	Adult	GI-LLI	4.41E-05
Invertebrates	Adult	1.91E-07	Adult	GI-LLI	1.11E-05
Shoreline Use	Teen	2.66E-07	Teen	Skin	3.10E-07
Total	Adult	1.16E-06	Adult	GI-LLI	5.52E-05

FIRST QUARTER - BATCH RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		
	<u>Age Group</u>	<u>Dose</u> <u>(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose</u> <u>(mrem/yr)</u>
Fish	Adult	1.95E-03	Adult	GI-LLI	5.61E-03
Invertebrates	Adult	4.71E-04	Adult	GI-LLI	2.40E-03
Shoreline Use	Teen	1.24E-03	Teen	Skin	1.44E-03
Total	Teen	2.72E-03	Adult	GI-LLI	8.24E-03

SECOND QUARTER - BATCH RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		
	<u>Age Group</u>	<u>Dose</u> <u>(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	<u>Dose</u> <u>(mrem/yr)</u>
Fish	Adult	1.03E-03	Adult	GI-LLI	2.31E-01
Invertebrates	Adult	5.36E-04	Adult	GI-LLI	3.69E-02
Shoreline Use	Teen	1.78E-03	Teen	Skin	2.09E-03
Total	Teen	2.97E-03	Adult	GI-LLI	2.68E-01

TABLE III-4  
Doses to the Population from Liquid Effluent Releases

FIRST QUARTER - CONTINUOUS RELEASES			
Pathway	Whole Body Dose (Man-Rem)	Organ	Organ Dose (Man-Rem)
Sport Fish	2.86E-04	GI-LLI	1.08E-03
Commercial Fish	2.94E-07	GI-LLI	1.11E-06
Sport Invertebrate	1.10E-04	GI-LLI	6.90E-04
Commercial Invertebrate	7.95E-07	GI-LLI	4.97E-06
Shoreline Use	3.58E-05	Skin	4.21E-05
Swimming	1.30E-07	Thyroid	1.30E-07
Boating	1.30E-07	Thyroid	1.30E-07
Total	4.33E-04	GI-LLI	1.81E-03

SECOND QUARTER - CONTINUOUS RELEASES			
Pathway	Whole Body Dose (Man-Rem)	Organ	Organ Dose (Man-Rem)
Sport Fish	1.37E-04	GI-LLI	6.56E-03
Commercial Fish	1.41E-07	GI-LLI	6.71E-06
Sport Invertebrate	8.01E-06	GI-LLI	4.58E-04
Commercial Invertebrate	5.76E-08	GI-LLI	3.27E-06
Shoreline Use	1.19E-06	Skin	1.39E-06
Swimming	2.01E-08	Thyroid	2.01E-08
Boating	2.01E-08	Thyroid	2.01E-08
Total	1.46E-04	GI-LLI	7.03E-03

FIRST QUARTER - BATCH RELEASES			
Pathway	Whole Body Dose (Man-Rem)	Organ	Organ Dose (Man-Rem)
Sport Fish	2.86E-01	GI-LLI	8.02E-01
Commercial Fish	2.94E-04	GI-LLI	8.10E-04
Sport Invertebrate	2.08E-02	GI-LLI	9.69E-02
Commercial Invertebrate	1.50E-04	GI-LLI	6.95E-04
Shoreline Use	5.54E-03	Skin	6.45E-03
Swimming	2.87E-05	Thyroid	2.87E-05
Boating	2.87E-05	Thyroid	2.87E-05
Total	3.12E-01	GI-LLI	9.00E-01

SECOND QUARTER - BATCH RELEASES			
Pathway	Whole Body Dose (Man-Rem)	Organ	Organ Dose (Man-Rem)
Sport Fish	1.59E-01	GI-LLI	3.26E+01
Commercial Fish	1.64E-01	GI-LLI	3.28E-02
Sport Invertebrate	2.58E-04	GI-LLI	1.51E+00
Commercial Invertebrate	1.85E-04	GI-LLI	1.08E-02
Shoreline Use	7.98E-03	Skin	9.36E-03
Swimming	7.70E-05	Thyroid	7.70E-05
Boating	7.70E-05	Thyroid	7.70E-05
Total	1.93E-01	GI-LLI	3.42E+01

#### IV. SOLID WASTE SHIPMENTS

Solid waste shipments from the plant may include irradiated fuel, solidified liquid waste and compressed solid waste.

##### 1. Regulatory Limits

The Technical Specifications for solid waste shipment are as follows:

##### Specification 2.4.3

- A. The total curie quantity and principle radionuclide composition shall be determined by measurement or estimates for all radioactive solid waste shipped offsite.
- B. Reports of the radioactive solid waste shipments, volumes, principle radionuclides, and total curie quantity, shall be submitted in accordance with Section 5.6.1.

The summation of solid waste and irradiated fuel shipments is presented in Table IV-1.



## V METEOROLOGICAL DATA

The meteorological data at 33 feet (10 meters) is summarized in Tables V-1, V-2, V-3, and V-4 .

The classification of atmosphere stability is as follows:

Stability Classification	Pasquill Categories	Temperature change with height(°C/100m)
Extremely unstable	A	<-1.9
Moderately unstable	B	>-1.9 to <-1.7
Slightly unstable	C	$\bar{\Sigma}$ -1.7 to <-1.5
Neutral	D	$\bar{\Sigma}$ -1.5 to <-0.5
Slightly stable	E	$\bar{\Sigma}$ -0.5 to < 1.5
Moderately stable	F	$\bar{\Sigma}$ 1.5 to < 4.0
Extremely stable	G	$\bar{\Sigma}$ 4.0

The data recovery rates are:

First Quarter ..... 79%

Second Quarter ..... 94%

The meteorological data for this period was manually recovered from strip charts except for the last two months of the year.

The new meteorological tower and data recovery unit should improve the historical data recovery rate significantly.

TABLE IV-1  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1/1/84 - 6/30/84  
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Non irradiated fuel)

1. Type of waste	Unit	First 6-month period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup> Ci	1.52E+2 4.59E+1	2.00E+1
b. Dry compressible waste, contaminated equip, etc.	m <sup>3</sup> Ci	6.82E+1 1.92E+0	5.00E+1
c. Irradiated components, control rods, etc.	m <sup>3</sup> Ci	2.55E+0 7.70E-2	5.00E+1
d. Other (describe)	m <sup>3</sup> Ci	. E+ . E+	. E+

2. Estimate of major nuclide composition (by type of waste)

a.	Cs-134	%	2.84E+1
	Cs-137	%	1.89E+1
	Co-58	%	6.79E+0
	Cr-51	%	4.64E+0
	Ba-140	%	1.89E+1
	Co-60	%	2.82E+0
b.	Cs-134	%	4.77E+0
	Cs-137	%	2.27E+1
	Co-58	%	2.51E+1
	Co-60	%	1.83E+1
	I-131	%	1.89E+0
	Ni-63	%	9.25E+0
	Ag-110m	%	2.51E+0
c.	Co-60	%	6.40E+1
	Ni-63		3.20E+1

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
26	Transport Truck - Exclusive Use Vehicle	Chem-Nuclear Systems, Inc. Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	NA	NR

TABLE V-1

**POWER CORPORATION**

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1964 THROUGH MARCH 31, 1964

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND Dir	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	1	1	0	0	0	2
NNE	0	0	13	1	0	0	14
NE	0	10	31	12	2	0	55
ENE	0	18	29	4	0	0	51
E	1	12	34	7	0	0	54
ESE	3	9	22	5	0	0	39
SE	2	7	12	0	1	0	22
SSE	3	7	9	7	0	0	25
S	0	9	4	1	2	0	16
SSW	3	19	19	12	0	0	52
SW	1	23	29	5	0	0	63
WSW	3	14	24	3	0	0	44
W	1	13	28	7	0	0	49
WNW	0	12	22	25	3	0	92
NW	1	4	19	6	2	0	32
NNW	1	0	5	4	1	0	11
TOTAL	19	102	130	99	11	0	621

PERIODS OF CALM (HOURS) - 0

TABLE V-1

R CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984

STABILITY CLASS - B

ELEVATION - 35 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	1	6	0	0	0	7
NE	0	2	13	6	0	0	21
ENE	0	6	10	0	0	0	16
E	2	10	9	1	0	0	22
ESE	0	2	0	0	0	0	2
SE	0	3	3	0	0	0	6
SSE	0	0	2	4	0	0	6
S	0	0	2	2	0	0	4
SSW	1	2	6	1	0	0	10
SW	0	3	0	4	2	0	9
WSW	1	0	1	0	1	0	3
W	1	0	3	3	0	0	7
WNW	0	5	5	6	1	0	16
NW	1	5	5	3	1	0	15
NNW	0	1	2	0	0	0	3
TOTAL	6	40	68	30	5	0	149

PERIODS OF CALM (HOURS) - 0

TABLE V-1

## POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1964 THROUGH MARCH 31, 1964

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	2	0	0	0	2
NE	0	1	3	5	0	0	9
ENE	1	1	5	0	0	0	7
E	0	7	7	0	0	0	14
ESE	0	0	1	0	0	0	1
SF	0	1	0	0	0	0	1
SSE	0	1	2	1	0	0	4
S	1	0	3	3	0	0	7
SSW	0	1	0	1	0	0	2
SW	0	0	2	4	0	0	6
WSW	0	1	0	0	0	0	1
W	1	0	0	0	0	0	1
WNW	0	1	1	0	2	0	4
NW	0	1	3	3	0	0	7
NNW	0	0	0	0	0	0	0
TOTAL	3	15	20	17	2	0	60

PERIODS OF CALM (HOURS) - 0



TABLE V-1

POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1964 THROUGH MARCH 31, 1964

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 -----	4-7 -----	8-12 -----	13-18 -----	19-24 -----	24+ -----	
N	0	0	2	0	0	0	2
NNE	0	1	19	1	0	0	21
NE	0	4	17	12	0	0	33
ENE	1	14	21	0	0	0	36
E	3	17	10	2	0	0	32
ESE	3	8	7	3	0	0	21
SF	1	11	2	2	0	1	23
SSE	2	4	7	0	0	0	13
S	0	7	9	6	9	0	31
SSW	5	9	15	1	0	1	31
SW	4	7	10	2	1	0	24
WSW	2	1	1	0	0	0	4
W	4	4	10	3	1	2	24
WNW	1	8	23	5	5	2	51
NW	1	17	18	3	0	0	39
NNW	1	6	4	1	0	0	12
TOTAL	28	118	161	41	16	13	397

PERIODS OF CALM (HOURS) - 0

TABLE V-1

ER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	2	1	0	0	0	3
NNE	1	6	4	0	0	0	11
NE	0	5	14	0	0	0	19
ENE	1	22	10	0	0	0	33
E	4	23	1	0	0	0	28
ESE	7	11	1	0	0	0	19
SE	4	6	1	0	0	0	11
SSE	1	3	1	0	0	0	5
S	1	6	8	1	0	1	17
SSW	7	8	6	0	3	2	26
SW	3	2	3	3	1	1	13
WSW	1	4	0	0	0	0	5
W	2	3	0	0	0	0	5
WNW	2	3	0	1	0	0	6
NW	1	8	1	0	0	0	10
NNW	0	8	0	0	0	0	8
TOTAL	35	120	31	5	4	4	219

PERIODS OF CALM (HOURS) - 1

TABLE V-1

## DA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1964 THROUGH MARCH 31, 1964

STABILITY CLASS - F

ELEVATION - 35 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	1	0	0	0	0	1
NNE	0	4	3	0	0	0	7
NE	2	9	2	0	0	0	13
ENE	1	20	4	0	0	0	25
E	12	23	1	0	0	0	41
ESE	3	4	1	0	0	0	8
SE	5	8	0	0	0	0	13
SSE	3	0	1	0	0	0	4
S	1	5	1	0	0	0	7
SSW	2	11	1	0	0	3	17
SW	3	1	0	0	1	2	7
WSW	2	1	0	0	0	0	3
W	3	4	0	0	0	0	7
WNW	5	1	0	0	0	0	6
NW	2	8	0	0	0	0	10
NNW	1	12	0	0	0	0	13
TOTAL	45	147	14	0	1	5	182

PERIODS OF CALM (HOURS) - 5

TABLE V-1

ER CORPORATION

HOURS BY WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1964 THROUGH MARCH 31, 1964

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	1	0	0	0	1
NE	1	0	4	0	0	0	5
ENE	5	16	1	0	0	0	22
E	9	13	0	0	0	0	22
ESE	5	0	0	0	0	0	5
SE	1	1	0	0	0	0	2
SSE	1	0	0	0	0	0	1
S	1	0	0	0	0	0	1
SSW	1	1	0	0	0	0	2
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	1	0	0	0	0	0	1
WNW	0	1	0	0	0	0	1
NW	3	1	0	0	0	0	4
NNW	1	2	0	0	0	0	3
TOTAL	29	15	6	0	0	0	70

PERIODS OF CALM (HOURS) - 4

TABLE V-2

CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	0	0	0	0	1
ENE	0	1	1	0	0	0	2
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	2	1	0	0	0	3

PERIODS OF CALM (HOURS) - 0



TABLE V-2

CORPORATION

HOURS AT EACH SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	2	1	0	0	0	3
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	1	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	0	2	1	1	0	0	4

PERIODS OF CALM (HOURS) - 0

TABLE V-2

CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	1	1	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	1	0	1
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	1	1	0	1	0	3

PERIODS OF CALM (HOURS) - 0

TABLE V-2

CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	1	2	0	0	4
ENE	0	4	9	1	0	0	14
E	0	2	0	0	0	0	2
ESE	1	2	2	1	0	0	6
SE	0	0	1	2	0	0	3
SSE	0	2	0	1	0	0	3
S	0	0	1	0	3	0	4
SSW	1	0	0	1	0	0	2
SW	0	0	0	1	0	0	1
WSW	0	0	0	3	0	0	3
W	0	0	0	3	0	0	3
WNW	0	1	1	0	4	0	6
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	2	12	15	15	7	0	51

PERIODS OF CALM (HOURS) - 0

TABLE V-2

CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	2	0	0	0	0	2
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	2	0	0	0	0	2
SSE	0	0	0	0	0	0	0
S	0	0	0	0	3	0	3
SSW	0	0	2	0	1	0	3
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	1	0	0	0	0	1
TOTAL	0	5	2	0	4	0	11

PERIODS OF CALM (HOURS) - 0

TABLE V-2

CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	2	0	0	0	0	2
NE	0	2	0	0	0	0	2
ENE	0	3	0	0	0	0	3
E	2	1	0	0	0	0	3
ESE	0	1	0	0	0	0	1
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	1	0	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	1	0	0	0	0	1
TOTAL	3	11	0	0	0	0	14

PERIODS OF CALM (HOURS) - 1



TABLE V-2

CORPORATION

HOURS AT EACH SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984 BATCH RELEASES

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	1	0	0	0	0	0	1
ENE	0	2	1	0	0	0	3
E	2	3	0	0	0	0	5
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	3	5	1	0	0	0	9

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## WIND INFORMATION

HOURS AT EACH SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	3	3	0	0	0	6
ENE	0	9	14	0	0	0	23
E	3	14	13	0	0	0	30
ESE	2	5	9	3	0	0	19
SE	0	11	17	3	0	0	31
SSE	0	12	28	8	0	0	48
S	0	8	32	6	0	0	46
SSW	1	30	42	16	0	0	89
SW	2	35	48	13	0	0	98
WSW	0	11	39	7	1	0	58
W	0	4	33	5	1	0	43
WNW	0	2	24	15	3	0	49
NW	0	0	5	2	0	0	12
NNW	0	0	2	0	0	0	2
TOTAL	8	155	307	78	5	0	553

PERIODS OF CALM (HOURS) - 0

TABLE V-3

CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 -----	4-7 -----	8-12 -----	13-18 -----	19-24 -----	24+ -----	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	2	1	0	0	0	3
ENE	0	6	6	0	0	0	12
E	0	9	8	0	0	0	17
ESE	0	4	2	0	0	0	6
SE	0	1	4	0	0	0	5
SSE	0	3	2	1	0	0	6
S	2	3	4	3	1	0	13
SSW	0	3	6	2	0	0	11
SW	0	9	9	0	0	0	18
WSW	0	4	10	0	0	0	14
W	0	5	5	2	0	0	12
WNW	0	5	10	1	3	0	19
NW	0	2	4	1	0	0	7
NNW	0	0	2	1	0	0	3
TOTAL	2	57	73	11	4	0	147

PERIODS OF CALM (HOURS) - 0

TABLE V-3

CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	1	0	0	0	1
NNE	0	0	0	0	0	0	0
NE	0	2	1	0	0	0	3
ENE	1	8	0	1	0	0	10
E	0	6	7	0	0	0	13
ESE	0	7	4	0	0	0	11
SE	0	0	2	1	0	0	3
SSE	0	3	2	0	0	0	5
S	0	1	2	0	0	0	3
SSW	1	6	2	1	0	0	10
SW	0	13	5	1	0	0	19
WSW	0	4	2	2	0	0	8
W	0	2	2	0	0	0	4
WNW	0	0	2	0	2	0	4
NW	0	2	3	0	1	0	6
NNW	0	0	0	0	0	0	0
TOTAL	2	54	35	6	3	0	100

PERIODS OF CALM (HOURS) - 0

TABLE V-3

CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	2	5	0	0	0	7
NNE	0	1	5	0	0	0	6
NE	0	10	17	2	0	0	29
ENE	1	40	24	1	0	0	66
E	7	48	19	1	0	0	75
ESE	10	41	21	3	0	0	75
SE	1	22	20	6	0	0	49
SSE	5	21	16	4	0	0	46
S	4	15	4	3	5	0	31
SSW	10	19	11	7	8	0	55
SW	10	23	14	5	1	0	53
WSW	2	13	14	5	0	0	34
W	6	15	6	4	1	0	32
WNW	2	13	19	6	8	0	48
NW	0	9	14	2	2	0	27
NNW	0	7	8	1	0	0	16
TOTAL	58	299	217	50	25	0	649

PERIODS OF CALM (HOURS) - 2



TABLE V-3

CORPORATION

HOURS AT EACH SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	1	0	0	0	0	1
NNE	0	3	0	0	0	0	3
NE	0	17	1	0	0	0	18
ENE	6	39	0	0	0	0	45
E	14	50	0	0	0	0	64
ESE	10	25	2	0	0	0	37
SE	9	18	1	1	0	0	29
SSE	5	4	3	0	0	0	12
S	5	1	0	0	6	6	18
SSW	1	1	2	7	15	1	20
SW	4	2	0	0	2	0	8
WSW	2	3	0	0	0	0	5
W	1	3	0	0	0	0	4
WNW	0	9	3	0	0	0	12
NW	1	8	1	0	0	0	10
NNW	1	6	0	0	0	0	7
TOTAL	59	190	13	1	23	7	293

PERIODS OF CALM (HOURS) - 1

TABLE V-3

CORPORATION

HOURS AT EACH SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	6	0	0	0	0	6
NNE	0	8	1	0	0	0	9
NE	2	10	0	0	0	0	12
ENE	11	47	2	0	0	0	60
E	23	47	0	0	0	0	70
ESE	6	32	1	0	0	0	39
SE	6	6	0	0	0	0	12
SSE	2	2	0	1	1	0	6
S	2	1	0	1	0	0	4
SSW	1	2	0	0	0	0	3
SW	1	2	1	0	0	1	5
WSW	0	0	0	0	0	0	0
W	0	1	1	0	0	0	2
WNW	0	0	0	0	0	0	1
NW	0	0	0	0	0	0	0
NNW	0	13	0	0	0	0	13
TOTAL	54	178	6	2	1	1	242

PERIODS OF CALM (HOURS) - 3

TABLE V-3

CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1984 THROUGH JUNE 30, 1984

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	1	0	1	0	0	0	2
ENE	8	18	3	0	0	0	29
E	11	18	0	0	0	0	29
ESE	1	5	0	0	0	0	6
SE	0	1	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	1	0	0	0	0	1
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	21	43	4	0	0	0	68

PERIODS OF CALM (HOURS) - 0

TABLE V-4

CORPORATION

## HOURS AT WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	6	0	0	0	6
NE	0	1	3	2	0	0	6
ENE	0	1	5	0	0	0	6
E	0	2	9	0	0	0	11
ESE	0	2	5	1	0	0	8
SE	0	0	2	0	0	0	2
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	1	0	0	0	0	1
SW	0	4	2	2	0	0	8
WSW	0	1	1	1	0	0	3
W	0	0	2	0	0	0	2
WNW	0	2	3	2	0	0	7
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	14	28	8	0	0	60

PERIODS OF CALM (HOURS) - 0

TABLE V-4

[REDACTED] CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - B

ELEVATION - 35 FT.

WIND DIR ----	WIND SPEED (MPH)				19-24 ----	24+ ----	TOTAL ----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----			
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	1	1	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	1	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	1	1	1	0	0	2

PERIODS OF CALM (HOURS) - 0



TABLE V-4

██████████ CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR ----	WIND SPEED (MPH)						TOTAL -----
	1-3 ----	4-7 ----	8-12 ----	13-18 ----	19-24 ----	24+ ----	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	1	0	0	0	1
E	0	2	1	0	0	0	3
ESE	0	0	1	0	0	0	1
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	1	0	0	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	1	1	0	0	0	2
NW	0	1	0	0	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	1	4	4	0	0	0	9

PERIODS OF CALM (HOURS) - 0

TABLE V-4

ER CORPORATION

## HOURS AT E WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	2	0	0	0	2
NE	0	0	1	0	0	0	1
ENE	0	0	5	0	0	0	5
E	0	4	3	2	0	0	9
ESE	0	4	3	1	0	0	8
SE	0	1	2	0	0	0	3
SSE	0	1	1	0	0	0	2
S	0	1	0	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	1	0	2	0	0	0	3
WNW	0	0	4	0	0	0	4
NW	0	2	0	0	0	0	2
NNW	0	0	0	0	0	0	0
TOTAL	1	13	22	3	0	0	40

PERIODS OF CALM (HOURS) - 0

TABLE V-4

## BOWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - E

ELEVATION - 35 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	2	0	0	0	0	2
E	0	8	0	0	0	0	8
ESE	0	2	0	0	0	0	2
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	2	1	0	0	0	3
NNW	0	0	0	0	0	0	0
TOTAL	0	14	1	0	0	0	15

PERIODS OF CALM (HOURS) - 0

TABLE V-4

ER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	3	0	0	0	0	3
E	0	8	0	0	0	0	8
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	2	0	0	0	0	0	2
WNW	2	0	0	0	0	0	2
NW	1	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	5	11	0	0	0	0	16

PERIODS OF CALM (HOURS) - 0

TABLE V-4

**POWER CORPORATION**

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1984 THROUGH MARCH 31, 1984 BATCH RELEASES

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	1	0	0	0	0	1
NW	1	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	1	1	0	0	0	0	2

PERIODS OF CALM (HOURS) - 0



## VI TECHNICAL SPECIFICATION REPORTS

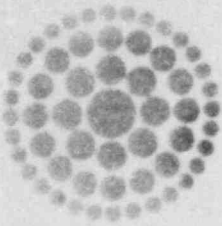
Technical Specification Sections 3.3.3.8, 3.3.3.9, and 3.12.1.2.b require reporting out of specification conditions in the Effluent and Waste Disposal Semiannual Report. The above referenced specifications became effective July 1, 1984, under Technical Specification Amendment 69. Since this Report deals with operations prior to July 1984, the requirements of these specifications do not apply. All subsequent Reports will address any out of specification event governed by these regulations.

## VIII ODCM AND PCP CHANGES

Technical Specifications Section 6.9.1.5.d requires reporting of changes to the Off Dose Calculation Manual (ODCM) and the Process Control Program (PCP). This specification became effective on July 1, 1984, under Technical Specification Amendment 69.

The Nuclear Regulatory Commission (NRC) reviewed the ODCM prior to implementation and provided comments for revisions to the manual. The ODCM in its entirety, including the NRC changes and minor editorial revisions by Florida Power Corporation are included in this Report. The changes are marked for ease of review.

The Process Control Program is presently under revision. The changes to the PCP will be submitted in the next Effluent and Waste Disposal Semi-annual Report.



P R P  
OFFICIAL COPY

**Florida  
Power**  
CORPORATION

August 29, 1984  
3F0884-19

Mr. J. P. O'Reilly  
Regional Administrator, Region II  
Office of Inspection & Enforcement  
U.S. Nuclear Regulatory Commission  
101 Marietta Street N.W., Suite 2900  
Atlanta, GA 30323

Subject: Crystal River Unit 3,  
Docket No. 50-302 *ID*  
Operating License No. DPR-72  
Effluent and Waste Disposal Semiannual Report

Dear Sir:

Pursuant to Title 10, Code of Federal Regulations, Part 50.36a(a)(2) and Crystal River Unit 3 Technical Specifications, Appendix "B", 5.6.1.B, Florida Power Corporation's Crystal River Unit 3 Effluent and Waste Disposal Semiannual Report for the period January 1, 1984 through June 30, 1984 is hereby submitted.

Sincerely,

G. R. Westafer  
Manager, Nuclear Operations  
Licensing and Fuel Management

DTW/feb

Enclosure

cc: Director of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

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*84-106*